

[0073] What is claimed as new and desired to be protected by Letters Patent of the
United States is:

1. A dry cement mixture, comprising:

a calcium aluminate component;

optionally a calcium silicate component;

a sodium phosphate compound; and

boiler ash.
2. The cement mixture of claim 1, comprising:

about forty weight percent of said calcium aluminate component;

about five weight percent of said sodium phosphate compound; and

about fifty-five weight percent of said boiler ash.
3. The cement mixture of claim 1, further comprising a polymeric compound capable of reducing leaching one or more of heavy metals from the cement mixture in use.
4. The cement mixture of claim 3, wherein said polymeric compound comprises an acrylic-styrene copolymer.
5. The cement mixture of claim 4, wherein the ratio of said acrylic-styrene copolymer to the cement mixture is between about 0.05 to one and about 0.15 to one.

6. The cement mixture of claim 1, wherein said sodium phosphate compound is polybasic sodium phosphate.

7. The cement mixture of claim 1, further comprising fibrous materials.

8. The cement mixture of claim 7, wherein said fibrous materials comprise at least one material selected from the group consisting of E-glass fibers, carbon fibers, and polypropylene.

9. The cement mixture of claim 1, wherein said boiler ash has a particle size such that about 65% is less than 75 mm diameter.

10. The cement mixture of claim 9, comprising about 55% boiler ash, about 40% calcium aluminate component, and about 5% sodium phosphate compound.

11. A dry concrete mixture, comprising:

active ingredients, including:

a calcium aluminate component;

optionally calcium silicate component;

a sodium phosphate compound; and

boiler ash; and

inactive aggregates.

12. The concrete mixture of claim 11, wherein the ratio of said active ingredients to said inactive aggregates is between about 60:40 and about 100:0.

13. The concrete mixture of claim 11, further comprising a polymeric compound capable of reducing leaching out of one or more heavy metals from said active ingredients in use.

14. The concrete mixture of claim 13, wherein said polymeric compound comprises an acrylic-styrene copolymer.

15. The concrete mixture of claim 11, further comprising fibrous materials.

16. The concrete mixture of claim 15, wherein said fibrous materials comprise at least one material selected from the group consisting of E-glass fibers, carbon fibers, and polypropylene.

17. The concrete mixture of claim 11, wherein said boiler ash has a particle size such that about 65% is less than 75 mm diameter.

18. The concrete mixture of claim 17, comprising about 55% boiler ash, about 40% calcium aluminate component, and about 5% sodium phosphate compound.

19. A lightweight dry concrete mixture, comprising:

active ingredients, including:

a calcium aluminate component;

optionally a calcium silicate component;

a sodium phosphate compound; and

boiler ash; and

inactive aggregates, including ceramic microspheres.

20. The lightweight dry concrete mixture of claim 19, wherein the ratio of said active ingredients to said inactive aggregates is between about 60:40 and about 75:25.

21. An all weather road capping material, comprising:

a chemically-bonded cement material, including:

a calcium aluminate component;

a calcium silicate component;

a sodium phosphate compound; and

boiler ash;

an aggregate material; and

water;

wherein said sodium phosphate compound reacts with said boiler ash to form one or more calcium phosphate compounds in said chemically bonded cement material.

22. The all weather road capping material of claim 21, wherein the percentage of said chemically-bonded cement material is between about sixty and about eighty percent.

23. The all weather road capping material of claim 21, wherein the ratio of said chemically-bonded cement material to said aggregate materials is about 80:20.

24. The all weather road capping material of claim 21, further comprising coarse aggregates at less than about thirteen percent.

25. The all weather road capping material of claim 21, further comprising sand aggregates at less than about thirteen percent.

26. The all weather road capping material of claim 21, further comprising a ratio of coarse aggregates to sand aggregates at about 40:60.

27. The all weather road capping material of claim 21, further comprising a polymeric compound capable of reducing leaching out of one or more heavy metals from said active ingredients in use.

28. The all weather road capping material of claim 27, wherein said polymeric compound comprises an acrylic-styrene copolymer.

29. The all weather road capping material of claim 21, further comprising fibrous materials.

30. The all weather road capping material of claim 29, wherein said fibrous materials comprise at least one material selected from the group consisting of E-glass fibers, carbon fibers, and polypropylene.

31. The all weather road capping material of claim 21, wherein said boiler ash has a particle size such that about 65% is less than 75 mm diameter.

32. The all weather road capping material of claim 31, comprising about 55% boiler ash, about 40% calcium aluminate component, and about 5% sodium phosphate compound.

33. A cementitious soil material, comprising:
a chemically-bonded cement material, including:

a calcium aluminate component;

optionally a calcium silicate component;

a sodium phosphate compound; and

boiler ash which chemically reacts with said sodium phosphate compound;
a polymeric compound capable of inhibiting leaching out of one or more heavy
metals from said chemically-bonded cement material in use;
soil; and
water.

34. The cementitious soil material of claim 33, wherein the ratio of said
chemically-bonded cement material to said soil is between about 10:90 and about 40:60.

35. The cementitious soil material of claim 33, wherein said boiler ash has a
particle size such that about 65% is less than 75 mm diameter.

36. The cementitious soil material of claim 35, comprising about 55% boiler ash,
about 40% calcium aluminate component, and about 5% sodium phosphate compound.

37. A method of forming a road capping material, comprising:
providing a chemically-bonded cement material that includes calcium aluminate
cement, optionally calcium silicate cement, a sodium phosphate compound, and boiler ash
which chemically reacts with said sodium phosphate compound;
providing coarse aggregates and sand aggregates;
providing water;

mixing said chemically-bonded cement material, said coarse aggregates, said sand aggregates and said water; and

allowing the mixture to cure.

38. The method of claim 37, further comprising mixing in a polymeric compound capable of reducing leaching out of one or more heavy metals from said chemically-bonded cement material in use.

39. The method of claim 38, further comprising mixing in a fibrous material.